

WHAT IS CLAIMED IS:

1. A method for analyzing an image, the method comprising the steps of:  
receiving data representing a plurality of elements of an image;  
characterizing each element in the plurality of elements according to a  
perceived characteristic; and  
5 identifying each element having a given characteristic that is adjacent an  
element having a characteristic approximately the same as the given characteristic.
2. The method of claim 1 wherein the step of receiving data includes the  
10 step of receiving data from a memory location.
3. The method of claim 1 wherein the step of characterizing includes the  
step of characterizing a plurality of pixels representing an image.
- 15 4. The method of claim 3 wherein the step of characterizing includes the  
step of identifying pixels representing background.
5. The method of claim 3 wherein the step of characterizing includes the  
step of identifying pixels representing black information.  
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6. The method of claim 3 wherein the step of characterizing includes the  
step of identifying pixels representing color information.
7. The method of claim 3 wherein the step of characterizing includes the  
25 step of identifying pixels representing an edge.
8. The method of claim 1 wherein the step of characterizing includes the  
step of evaluating a luminance value for a pixel and comparing the luminance value to  
a number.  
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9. The method of claim 8 wherein the step of evaluating a luminance  
value includes the step of comparing the luminance value to a number representing a

white threshold.

10. The method of claim 8 wherein the step of evaluating a luminance value includes the step of comparing the luminance value to a number representing a black threshold.

11. The method of claim 8 wherein the step of evaluating a luminance value includes the step of assigning to the pixel a representation of either one of black, white or gray.

12. The method of claim 8 wherein the step of evaluating a luminance value includes the step of assigning to the pixel a representation of either one of black, white or color.

13. The method of claim 1 wherein the step of identifying each element that is adjacent includes the step of identifying each element that is adjacent an element having the given characteristic.

14. The method of claim 1 wherein the step of identifying each element that is adjacent includes the step of using an eight-neighbors system.

15. The method of claim 1 wherein the step of identifying each element that is adjacent includes the step of identifying adjacent pixels that are background pixels.

16. The method of claim 1 wherein the step of identifying each element that is adjacent includes the step of identifying adjacent pixels that are non-background pixels.

17. The method of claim 1 wherein the step of identifying each element that is adjacent includes the step of identifying adjacent pixels that are characterized as either one of black, gray, gray edge, color, color edge, or white.

18. The method of claim 1 wherein the step of identifying each element

that is adjacent includes the step of identifying adjacent pixels that are characterized as background, and further including the step of identifying adjacent pixels characterized as background and also characterized with a label.

5           19.     The method of claim 1 wherein the step of identifying each element that is adjacent includes the step of identifying adjacent pixels that are characterized as non-background, and further including the step of identifying adjacent pixels characterized as non-background and also characterized with a label.

10           20.     The method of claim 19 wherein the step of identifying pixels with a label include the step of identifying pixels labeled one of edge, color, gray, and black.

            21.     The method of claim 19 further comprising the step of determining if the number of non-background pixels having a given label and that are adjacent are  
15     less than or greater than a given number.

            22.     A method of processing elements in an image, the method comprising the steps of:  
                    receiving a plurality of elements in an image;  
                    identifying elements of the plurality of elements of the image that represent an  
5     edge of a portion of the image; and  
                    identifying elements of the image that represent an edge and that are adjacent at least one other element representing an edge.

            23.     The method of claim 22 wherein the step of identifying elements of the image representing an edge includes the step of using a gradient operation on groups of pixels to determine if an individual pixel is part of an edge.

5           24.     The method of claim 22 wherein the step of identifying elements of the image that represent an edge and that are adjacent includes the step of selecting a first pixel that represents an edge, and identifying a plurality of adjacent pixels, and identifying any of the plurality of adjacent pixels that represent an edge.

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25. The method of claim 24 wherein the step of identifying a plurality of adjacent pixels includes the step of identifying pixels that are the next pixel away from the first pixel.

15 26. The method of claim 24 wherein the step of identifying a plurality of adjacent pixels includes the step of identifying pixels according to the eight-neighbors system.

20 27. The method of claim 24 wherein the step of identifying any of the plurality of adjacent pixels that represent an edge includes the step of labeling the adjacent pixels that represent an edge with a unique label.

25 28. The method of claim 24 wherein the step of identifying any of the plurality of adjacent pixels that represent an edge includes the step of identifying pixels representing an edge that are adjacent at least two other pixels representing an edge.

30 29. The method of claim 24 further comprising the step of identifying pixels representing substantially the same image characteristic.

35 30. The method of claim 29 wherein the step of identifying pixels representing substantially the same image characteristic includes the step of identifying pixels having a label corresponding to the same characteristic of one of color, gray, or black.

31. The method of the claim 30 further comprising the step of identifying pixels having the same label and that are connected to one another.

40 32. The method of claim 31 wherein the step of identifying pixels that are connected includes the step of identifying pixels having the same label that are connected through other pixels having the same label.

33. The method of claim 32 wherein the step of identifying pixels having the same label that are connected includes the step of applying a sub-label to the  
45 connected pixels that have the same label.

34. The method of claim 29 further comprising the step of identifying pixels having substantially the same image characteristic and that are inter-connected.

50 35. The method of claim 34 further comprising the step of applying a unique sub-label to the inter-connected pixels having the same image characteristic.

36. The method of claim 34 further comprising the step of determining the number of interconnected pixels having substantially the same image characteristic.  
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37. The method of claim 36 wherein the image characteristic is a first image characteristic, and further comprising the step of determining the number of interconnected pixels that have a second image characteristic and comparing it to the number of pixels having the first image characteristic.  
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38. The method of claim 37 further comprising the step of identifying pixels having the first image characteristic and that are adjacent to pixels having the second image characteristic.

65 39. The method of claim 37 further comprising the step of changing the pixels having the second image characteristic to an image characteristic closer to the first image characteristic.

40. The method of claim 39 wherein the step of changing includes the step  
70 of changing a numeric value for the pixels having the second image characteristic by multiplying the numeric value by a number less than one.

41. The method of claim 39 wherein the step of changing includes the step  
75 of changing a numeric value for the pixels having the second image characteristic to an average of a numeric value for the pixels having the first image characteristic.

42. The method of claim 37 wherein the first image characteristic is black and the second image characteristic is other than black.

80 43. The method of claim 42 further comprising the step of counting the number of non-black pixels that are interconnected and comparing to the number of interconnected black pixels.

85 44. A method of processing elements in an image, the method comprising the steps of:

receiving a plurality of elements in an image;

characterizing each element in the plurality of elements according to a perceived characteristic;

90 identifying each element having a characteristic representing background that is adjacent an element having a characteristic also representing background;

identifying elements of the plurality of elements of the image that represent an edge of a portion of the image; and

identifying elements of the image that represent an edge and that are adjacent at least one other element representing an edge.

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